

# Transportation Active Safety Institute

## TASI: Our Focus on the Human Machine Interface

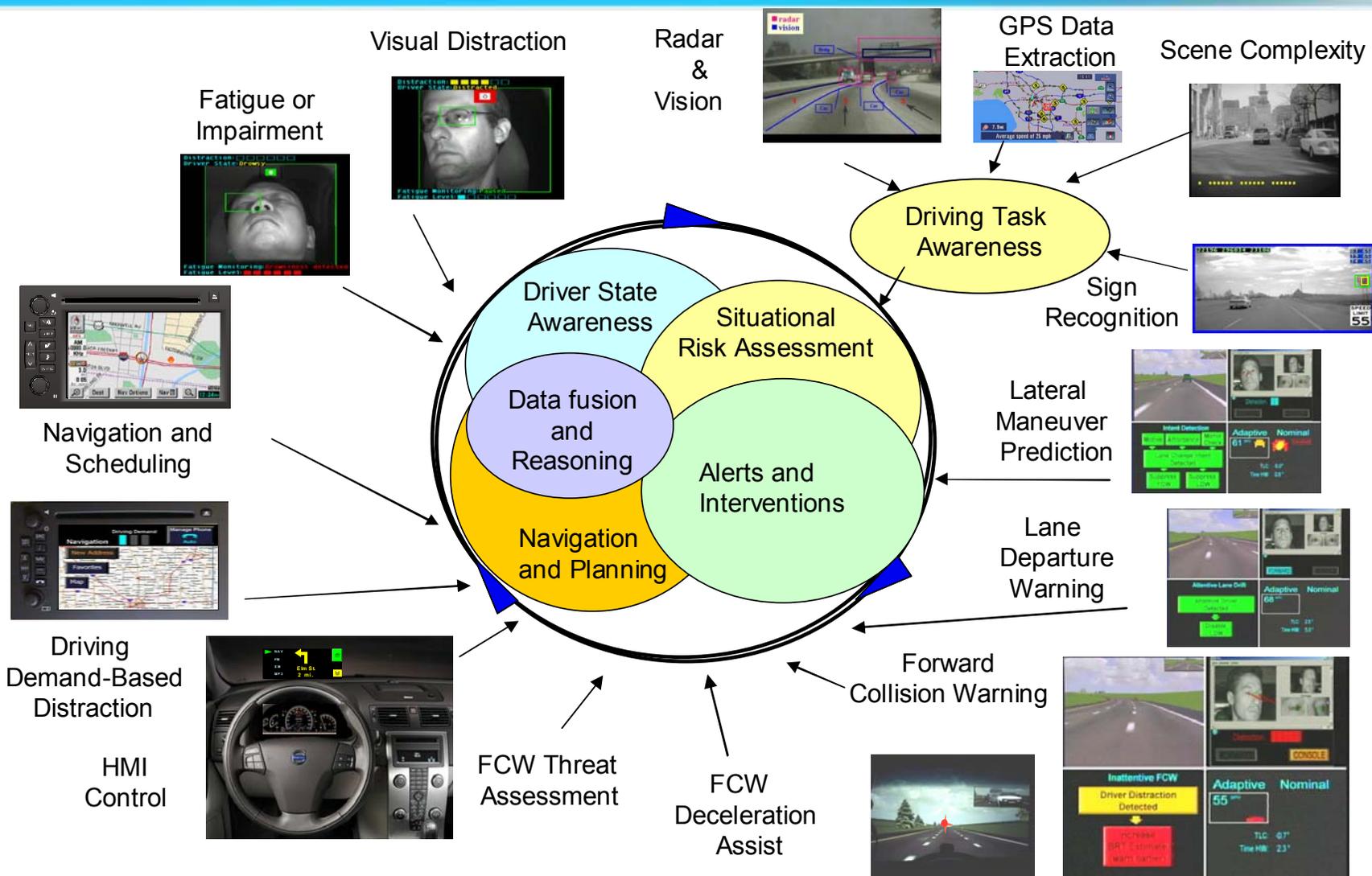


**An Industry-Academic-Government Consortium to  
Advance the Use of Active Safety Systems to Reduce  
Vehicle Crashes and Save Lives**

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# Human Machine Interface Fog



# Obstacles to introduction and acceptance

- One of the biggest obstacles to introduction and acceptance of Active Safety Systems is absence of a standard HMI protocol.
- Active Safety Systems provide two types of responses:
  - Warnings that require driver intervention
    - » Beep, Flash, rumble of seat
  - Autonomous responses triggered by driving situation
    - » Apply brakes strategically, adjust steering angle, etc.
- Autonomous actions provide the most consistent responses and simplify design of Active Safety Systems.
- However, some driving situations require a more complex response, obtainable only through human intervention.

# Some HMI issues for active safety systems

- **How do people react?**
  - What is the average and range of abilities?
    - » Hearing
    - » Vision
    - » Coordination
    - » Attention span
    - » Multi-tasking ability
- **Does a trigger yield an appropriate reaction?**
- **Should the driver have choices of how information is displayed?**
- **Should the driver have choices regarding alerts?**

# Questions relating to HMI Design

- **Is it possible to warn the driver?**

**YES: What's the best way?**

- What is range of human ability?
- How many warnings is too many?
- Which warning is best for each scenario?

**NO: What can we do to prevent the need for warnings?**

- How much information can the driver process?
- Which information is most important in a given scenario?
- How is the information best conveyed?

- **What standards are needed?**

# Standards will eliminate a possible source of driver confusion

- Drivers need consistent alerts and displays.

## Audible Alerts



## Visual Alerts



## Haptic Alerts



Motorized  
Seatbelt

Seat Vibration

- Acceptance / effectiveness also depend on
  - Reaction time
  - Data processing speed
  - Ability to distinguish among signals
  - Ability to respond without panicking
  - etc.

# Summary

- Again, one of biggest obstacles to introduction and acceptance of Active Safety Systems is absence of a standard HMI protocol.
- TASI universities will work with industry partners to design experiments to address these issues.
- Target start date is beginning of 2<sup>nd</sup> quarter.
- Questions?

# Contacts

- Interested in specific activities? Please contact:

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# Slides describing TASI Activities follow

- Flow charts show larger scope of TASI's activities.
- Activities in which Human Factors play a key role are highlighted in red.

# TASI Activities

- **Mine available data;**
- **Run experiments to obtain missing data**
  - Accident data analysis
  - Benefit/effectiveness analysis
  - Cost sensitivity analysis
  - **Human Factors/Biomechanics**
- **Technology Research and Development**
  - New sensors
  - Algorithms

## *Common Protocols & Processes*

- **HMI protocol**
- Product performance testing
- Test Methodology

# TASI Activities

## ▪ Common Protocols & Processes

- HMI protocol
- Performance testing
- Test Methodology



## ▪ Evaluation/Validation

- Protocols
- HMI
- Performance



## ▪ Test Methodology

- Laboratory/bench-test
- Hardware-in-loop simulation
- Closed-course test track
- Instrumented roadway segment
- On-road

## ▪ Consumer Awareness/Education

